

The claims defining the invention are as follows:

1. An free-piston internal combustion engine of a type having at least one pair of longitudinally opposed cylinders with electricity generating stator means fixed relative thereto, respective pistons arranged in said cylinders for cycles of reciprocating compression and power strokes, inlet valve means for introducing air or a fuel mixture into said cylinders prior to said compression stroke, outlet valve means for the expulsion of exhaust gas following said power stroke and said pistons being linked together with a linear actuator for movement therewith whereby during operation of said engine the reciprocating strokes of said pistons and linear actuator with respect to said stator means generates usable electrical energy and said inlet valve means being located in said pistons and comprising a portion of the heads thereof.
2. The free-piston internal combustion engine as claimed in claim 1 wherein said cylinders fire alternately in a two stroke cycle.
3. The free-piston internal combustion engine as claimed in claim 2 where said stator means is located between said opposed cylinders and said linear actuator is located between said respective pistons.
4. The free-piston internal combustion engine as claimed in

10050679-011502

claim 3 wherein said air or fuel mixture is drawn into a compression chamber associated with said linear actuator during said compression strokes.

5. The free-piston internal combustion engine as claimed in claim 4 wherein said air or fuel mixture is compressed in said compression chamber during said power strokes before introduction into said cylinders.

6. The free-piston internal combustion engine as claimed in claim 5 wherein said inlet means are poppet valves which are biased to a closed position by springs and said air or fuel mixture is compressed to a pressure that opens said poppet valves against said springs and opposing kinetic forces to initiate gas exchange at the end of said power strokes.

7. The free-piston internal combustion engine as claimed in claim 6 wherein during the compression strokes the inlet valve means are held closed by gas forces in the cylinders.

8. The free-piston internal combustion engine as claimed in claim 7 wherein said combustion chamber is formed by a cylindrical sleeve disposed inside said stator means and said linear actuator is fitted with gas seals to engage said sleeve and act as a reciprocating compressor piston.

9. The free-piston internal combustion engine as claimed in claim 8 wherein said outlet valve means are poppet valves

10050679-011502

located in the heads of said cylinders and are opened by solenoids for variable periods to optimise the efficiency of said gas exchange at a given power level.

10. The free-piston internal combustion engine as claimed in claim 9 wherein said cylindrical sleeve is formed from a ceramic or a high temperature plastic.

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